

Land, but that it was visited previously by Baffin and by Cornelis Roule. His arguments are not at all borne out by the authorities to which he refers. Nor will the British Government be guided by any proposals not originating from those experienced arctic officers upon whose advice they rely, so that Dr. Petermann's suggestions about sending one steamer to the west coast and another to the east coast of Greenland might have been spared.

English geographers have always fully recognised the valuable services of Dr. Petermann as a cartographer, and the important and useful work he has long done in collecting and disseminating geographical information. But at the same time it cannot be forgotten that his persistent adherence to an indefensible theory has retarded discovery, and that in 1865 his inopportune interference had a most injurious effect upon the prospects of arctic exploration from this country. That danger is at last overcome, but those who have borne the heat and burden of the day, cannot but protest against Dr. Petermann's present assumption of the position of an arctic authority and adviser.

Nov. 22

CLEMENTS R. MARKHAM

The Present State of the Arctic Ice Barriers

IN a letter from Capt. David Gray, quoted by Dr. Petermann (*NATURE*, vol. xi. p. 39), some very interesting observations on the arctic drift ice of this year's summer are recorded, which Capt. Gray regards as justifying the conclusion that "nearly the whole of the ice was driven out of the arctic basin last summer."

Capt. Gray's observations appear to be limited to the coast of Greenland. If corresponding phenomena were presented in other and distant parts of the Arctic Ocean, they must afford strong confirmation of his conclusion. I have lately returned from a summer visit to Arctic Norway, having sailed round the North Cape and into the Varanger Fjord, stopping a few days at Tromsø and halting at Hammerfest, Vardö, Vadsö, and other arctic stations, and I was much surprised at the curious difference between the climate I found there this summer and that which I previously experienced at the same season.

The following extract describes the temperature between Tromsø and Hammerfest during my first visit in July 1856:—"The weather was excessively hot. During the hottest part of the day the thermometer stood at 77° in the cabin, at 92° in the smoking saloon—a little cabin built on deck—and 108° in the sun: on shore, in the valleys, it must doubtless have been much hotter. The contrast of this glaring Italian, or I might almost say Brazilian sky, with the snow-clad rocks and glaciers dipping almost to the sea-edge, is very striking. It was a continual source of wonderment; one of the few scenes which one does not become accustomed to, but retains its novelty day after day."* Such was the prevailing weather during the summer of 1856, and such is the usual summer weather of Arctic Norway from the beginning of July until a week or two after the disappearance of the midnight sun. This year it was miserably different, to the great disappointment of the ladies I ventured to pilot thus far, and vexation to myself. The contrast was strikingly shown in the course of a walk up the Tromsödl. This summer I made two excursions up this valley with a fortnight's interval. On both occasions the lower part of the valley was a mud swamp from recent snow-thaw. In 1856, three weeks earlier in the season than my second visit this year, the snow water had evaporated, leaving the path hard and dry. In 1856, the poor little Lapps were outside their huts, gasping with heat and varnished with oily perspiration; their huts were so insufferably hot that only one or two out of a party of seven or eight male travellers dared to venture inside. This year, the ladies, as well as myself, were glad to warm ourselves by sitting round the hut fire upon the boulders that serve as chairs. Drizzling rain and cold mists replaced the oppressive heat, the brilliant sky, and rainless summer-time of 1856.

The Duke of Roxburgh, who has spent sixteen summers in Arctic Norway (he has the Alten salmon river opening in lat. 70°), told me that the low temperature and drizzling mistiness of this summer was quite exceptional to his experience; that the summer of 1868, which was memorably cold, was not so bad as this. The usual crops of rye and potatoes were expected to fail completely this summer.

This unusual summer is the more remarkable when compared with that of England, which, judging by the abundance of the wheat crop, must at least have reached, if not exceeded, the average of mean warmth. The exceptional arctic summer must

have been due to some exceptional arctic influence. The southward drifting of large quantities of polar ice, and consequent removal of some of the barriers that stand between us and the north pole, will account for what I have described, provided the loosened ice was sufficient in quantity and eastward extension.

The North Cape, though in lat. 71°, is not visited by icebergs; the sea there, and for some distance further north, is sufficiently warmed by the Gulf Stream to remain quite open all the year through. The free northward exposure must, however, render this part of the Arctic Ocean very susceptible to the cooling influence of an unusual southward drift of polar ice, and the peculiarities of this year's summer were exactly those which such an abnormal cooling of the sea would produce. These were evidently exaggerated over the open sea a little further north. During the few fine days we had while going round the island of Magerö, the sun was visible until about 11 or 11.30 P.M., but on approaching the north horizon it dipped into a mist-bank which hung with apparent permanency over the northernmost and most distant part of the sea. As we were desirous of seeing the actual orb of the sun quite at midnight, this repeated disappearance just at the critical time was of course especially noted. I afterwards learned that on these same nights, when the midnight sun thus played at hide-and-seek with us over the Arctic Ocean, it was clearly seen by spectators further south, who had a land or near coast horizon.

These facts, in conjunction with "the important information" given by Capt. Gray, justify us, I think, in looking forward very hopefully for important results from the proposed Arctic Expedition, and afford strong reasons for avoiding any possible source of delay that might stand in the way of an early start to make full use of next summer.

W. MATTIEU WILLIAMS

Zoological Gardens, Regent's Park

I MUST trouble you with a few words in reply to your correspondents "Viator" and Mr. C. Traill (vol. xi. p. 67.)

It is quite true that our gardens in the Regent's Park are "too small in area." We have for many years endeavoured to get them enlarged; but all we have succeeded in obtaining is the slip of land on the north side of the Regent's Canal, where the new North Entrance has been made. If "Viator" has any influence with the First Commissioner of Works, and can persuade him to grant us a further extension on the south side, we shall be truly grateful.

I admit also that the larger carnivora are at present badly housed, and that their dens are much too confined. This, however, will, I trust, be remedied by the erection of the new Lions' House, which will be commenced early next year.

The plan of establishing a second Garden for breeding purposes out of London was adopted by the Council some years ago, but was not found to answer. It has, however, many advantages, and may be again tried when our funds shall permit of it.

"Viator" finds great fault with our drainage. He cannot be aware that the Sanitary Authorities of the district, who have been much exercised in this matter, have pronounced us free from all blame.

Finally, I may say, without any wish to disparage the continental gardens (with all of which I am well acquainted), that none of them can vie with those of this Society in the extent, variety, and completeness of its living collection, or in the rarity of many of the objects exhibited. That this collection is appreciated by the public is fully evident from the yearly increasing number of visitors and the continual augmentation of the list of members.

As regards the remarks of Mr. Traill, I have to observe that the Society's "Proceedings" contain several papers by the Secretaries and Superintendents of the Gardens relating to points in the economy of the animals in them; and that the Prosecutor (whose office was created mainly with the hope of utilising the collection more completely in a scientific point of view) has lately devoted considerable attention to this subject, on which he will, no doubt, ultimately give us the benefit of his observations.

Dec. 1

P. L. SCLATER

Utilisation of Aquaria

I SHALL be glad if you will allow me to use your columns as a medium of inquiry with regard to the Brighton and Manchester Aquaria. Are there any arrangements in force already, or contemplated, whereby these fine institutions can be utilised for the promotion of zoological research? If I am not mistaken, the

* "Through Norway with a Knapsack," p. 139.

British Association, at its meeting at Bradford, appointed a committee, the function of which was to see what arrangements of this nature could be carried out. I am not aware, however, that the committee has ever made any report, or if it has arrived at any conclusion on this subject.

INQUIRER

Nov. 24

Discovery of Remains of Plants and Insects

I THINK I informed you about two years ago of the discovery of a bed of plants, with leaves, and a great variety of seeds, in this locality; also the wings of a Libellula, and the beak of a bird. As little interest was attracted, I have not hitherto informed you of the subsequent finding of a bed of insects—flies, gnats, and the larva and pupa of the latter, the larva in countless thousands—also the wings, in great numbers, of a variety of flies, butterflies, and one or two grasshoppers; also a wing resembling that of the Mole Cricket. There are, likewise, two or three beetles. The insects and wings are frequently associated with a very pretty Lymnea, in considerable numbers, and an occasional Planorbis, both retaining a high polish. I have also noticed a solitary small white Cyclostoma in the same bed. There are, I think, two feathers among the specimens obtained. Perhaps, as some interest has been shown in a similar discovery in Scotland, some of your readers may like to be informed of this. I am much indebted to the Rev. T. G. Bonney, of St. John's College, Cambridge, to whom you referred me, for advice and encouragement in examining these beds.

Gurnet Bay, Nov. 23

E. J. A'COURT SMITH

Sounding and Sensitive Flames

IN a letter which I have just received from Dr. A. K. Irvine, of Glasgow, my attention is drawn to a short abstract of some of his experiments with Barry's sensitive flame, which appeared in the *English Mechanic* of Dec. 15, 1871, a few months previously to the appearance in the *Journal of the Franklin Institute*, and in the *American Journal of Science*, of the description, referred to briefly in my last letter (*NATURE*, vol. xi, pp. 6 to 8), of Mr. Geyer's researches on the acoustic properties of the same flame, some particulars of which Dr. Irvine appears also to have noticed independently. The few lines in which his observations are recorded corroborate so fully the character and mode of action of the flame as now pretty perfectly established, that a short extract from them will scarcely be without interest, from the satisfactory support which it offers to the accounts and explanations that other investigators of this flame have elsewhere given in graphic terms of its appearance.

After noticing that it can be produced with an ordinary street-lamp burner (perhaps the straight quill-form, still to be met with in some streets of Glasgow, is here meant), as well as with pin-hole jets of steatite; and that whatever kind of gauze may, with slight differences of the effect, be used, the further the wire-gauze can be removed from the burner without the flame breaking or flattening (? fluttering) on the gauze, the more sensitive is the flame,—Dr. Irvine continues to describe the further characters of the flame as follows:—

"4. The roaring which takes place when any sound disturbs the flame is evidently in consequence of the greater proportion of air which mixes with the gas before passing through the wire-gauze; in short, when it roars and flattens on the gauze, it is an explosive mixture that burns.

"5. If a suitable tube (for instance, a paraffin lamp chimney of proper dimensions) is placed on the wire-gauze, it will be found that a musical note is produced every time the flame is disturbed by a sound with which it sympathises.

"6. A mixture of any inflammable gas and air passing through wire-gauze, over which a suitable chimney is placed, will give a note varying in pitch with the dimensions of the chimney and size of the flame."

Proceeding on this principle, Dr. Irvine adds that he had recently constructed and patented a form of miner's safety-lamp, which, when an explosive mixture of gas and air enters it, gives an audible signal of the dangerous condition of the mine.

It may be questioned if it is quite safe to excite rapid vibrations of a gas-flame burning on the wire-gauze inside a safety-lamp placed in an explosive atmosphere; but if any vibrations of the flame that are thus produced are limited (as it appears possible to ensure, by a proper construction of the lamp) to the extremely small oscillations of a high-pitched note, then no elements of danger in this new contrivance need necessarily be

introduced or apprehended from the sounding action of the flame. In this and in other cases of their employment which have suggested themselves to experimenters on the acoustic properties of gas-flames, there seem to be hopeful promises of advantageous application of the sensitive and sounding properties that certain gas-flames possess in a very high degree. But it is to the explanation of the cause of the prostration, and to the account of the case of musical sensitiveness in Barry's wire-gauze flame when disturbed by external sounds, that it is particularly desired to direct attention in the foregoing extract from Dr. Irvine's brief description. The reason that the author assigns to them, and thence to the monitory action of his singing safety-lamp, that increased inflammability of the burning gas-mixture is at once the source of the sensitiveness, silent or sounding, of the wire-gauze flame, and the necessary condition of the atmosphere for the alarm note sounded by the newly invented safety-lamp, is so clearly expressed and illustrated by the order of his experiments, that as regards the probable mode of action of the disturbed gas-current adopted to explain the sensitive effects observed, there can be no doubt of the correctness of Dr. Irvine's view.

The gas-current, before reaching the wire-gauze, will naturally entangle and mix with a larger quantity of air when it is disturbed, by presenting a greater surface to the air in that state than when it issues smoothly. In the latter case it is not inflected into the tortuous wave-line of many folds and curves into which it must be bent on leaving the burner and passing from a fixed jet into an atmosphere oscillating rapidly to and fro under the action of external sounds. The sound-wave of the air into which it flows thus serves to incorporate more air with the upward stream and to render the combustion of the mixture more condensed and prompt, and the appearance of the flame in consequence more contracted and boisterous than when the gas-jet burns in a surrounding atmosphere of quiescent air.

Newcastle-on-Tyne, Nov. 14

A. S. HERSCHEL

SCIENCE IN MUSIC

AT the first meeting of the Royal Society on Thursday evening, the 19th ult., a paper was read by Mr. A. J. Ellis, F.R.S., on "Musical Duodenics." This formed the conclusion of a series of papers (the preceding ones having been published in the Minutes of Proceedings) on Just Intonation and Temperament in Music.

The author explained the defects of the ordinary keyed instruments, such as the pianoforte and organ, which were limited to twelve sounds in the octave, and were now tuned by a system which he characterised as the "worst possible," every element of harmony in them being put out of tune in all keys. To produce just intonation, it was necessary to have many more than twelve sounds in the octave; and he exhibited a chart giving a classified list of seventy-eight such notes, distinguished by the ordinary musical signs, with the addition of certain other marks which defined exactly the pitch of the notes, while their respective positions in the chart gave, by simple inspection, a correct idea of their relations to each other. Mr. Ellis then stated that as the large number of notes required by correct theory became troublesome in practice, the plan had been adopted of sacrificing absolute truth in some instances, and introducing a trifling error, by which means the requisite number of notes was much reduced, while the error was so small as not to offend the ear in any sensible degree.

Having determined thus on the number of notes to be used, the practical problem arose how best to introduce them in an instrument. Many contrivances had been suggested, involving new key-boards and modes of fingering; but considering the difficulty of introducing changes of this kind, preference was given to other plans, which retained the twelve notes of the ordinary key-board. To enable such a system to be carried out, it was necessary to make choice of certain sets of twelve notes, to be used when playing in certain keys; and to furnish information to guide these selections was the chief object of the paper. Such a set of twelve notes was called by Mr. Ellis a musical *duodene*, and the chart exhibited many of these